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Ethics and Mortality heterogeneity

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1. Heterogeneity in Mortality
2. Introduction to Ethics
3. Ethics in insurance: Discrimination and heterogeneity
4. Ethics in insurance: Data science and new forms of data
5. Ethics in insurance: Central questions for actuaries
6. Ethical theories
7. A framework for ethical reasoning

Heterogeneity in Mortality

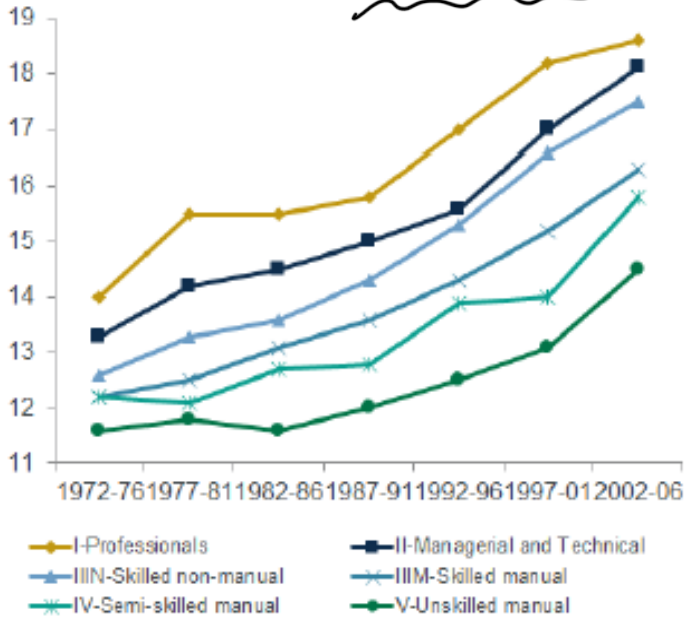
Heterogeneity in Mortality

There exists a well-documented relationship between socio-economic variables and mortality, life expectancy and health risk:

- Occupation
- Education
- Income
- Gender
- Race or ethnicity

Life expectancy and Occupation

Male life expectancy at age 65 by **social class** – England and Wales



Source: ONS Longitudinal Study

Life expectancy and Education

Table 1. Absolute and relative differences by education level in life expectancy at ages 25, 45, 65 and 85 years for Australian men and women, 2016.

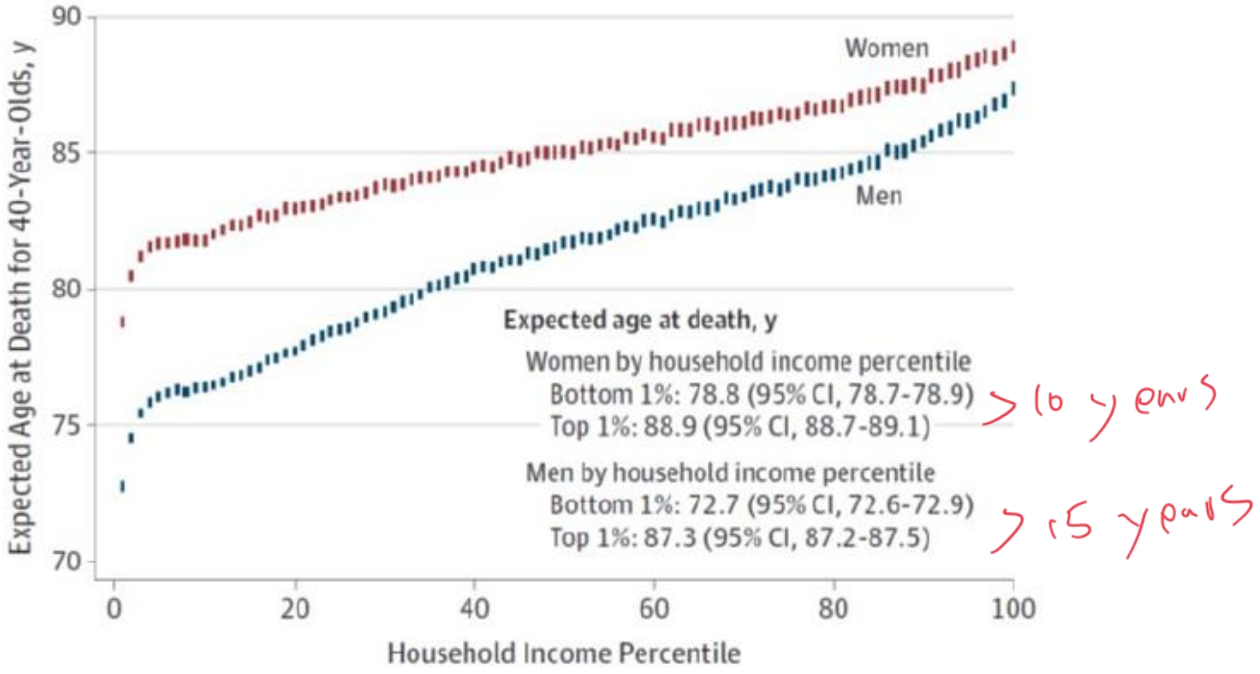
	Men Life expectancy (95%CI)	Difference in years (95%CI)	Ratios	Women Life expectancy (95%CI)	Difference in years (95%CI)	Ratios
Life expectancy by education level						
At age 25 years						
Bachelor's degree (highest)	61.2 (61.0, 61.4)	0.0	1.00	63.6 (63.4, 63.9)	0.0	1.00
Other post-secondary & Yr12	59.5 (59.3, 59.7)	1.7 (1.4, 2.0)	0.97	63.3 (63.0, 63.5)	0.3 (-0.1, 0.7)	1.00
Other post-secondary, no Yr12	57.6 (57.4, 57.7)	3.6 (3.3, 3.9)	0.94	61.9 (61.6, 62.1)	1.7 (1.3, 2.1)	0.97
No post-secondary & Yr12	57.2 (56.9, 57.4)	4.0 (3.6, 4.4)	0.93	61.3 (61.1, 61.6)	2.3 (1.9, 2.7)	0.96
No post-secondary, no Yr12 (lowest)	52.1 (51.9, 52.3)	9.1 (8.8, 9.4)	0.85	58.1 (58.0, 58.3)	5.5 (5.1, 5.9)	0.91

doctors lifestyle

Source: **Welsh, J., Bishop, K., Booth, H. et al. Inequalities in life expectancy in Australia according to education level: a whole-of-population record linkage study. Int J Equity Health 20, 178 (2021). https://doi.org/10.1186/s12939-021-01513-3**

Life expectancy and Income

Period Life Expectancy by Lifetime Income in the USA at age 40, 2001-2014



Source: Raj Chetty, Michael Stepner,, Sarah Abraham, et al. The Association Between Income and Life Expectancy in the United States, 2001-2014. JAMA, 2016

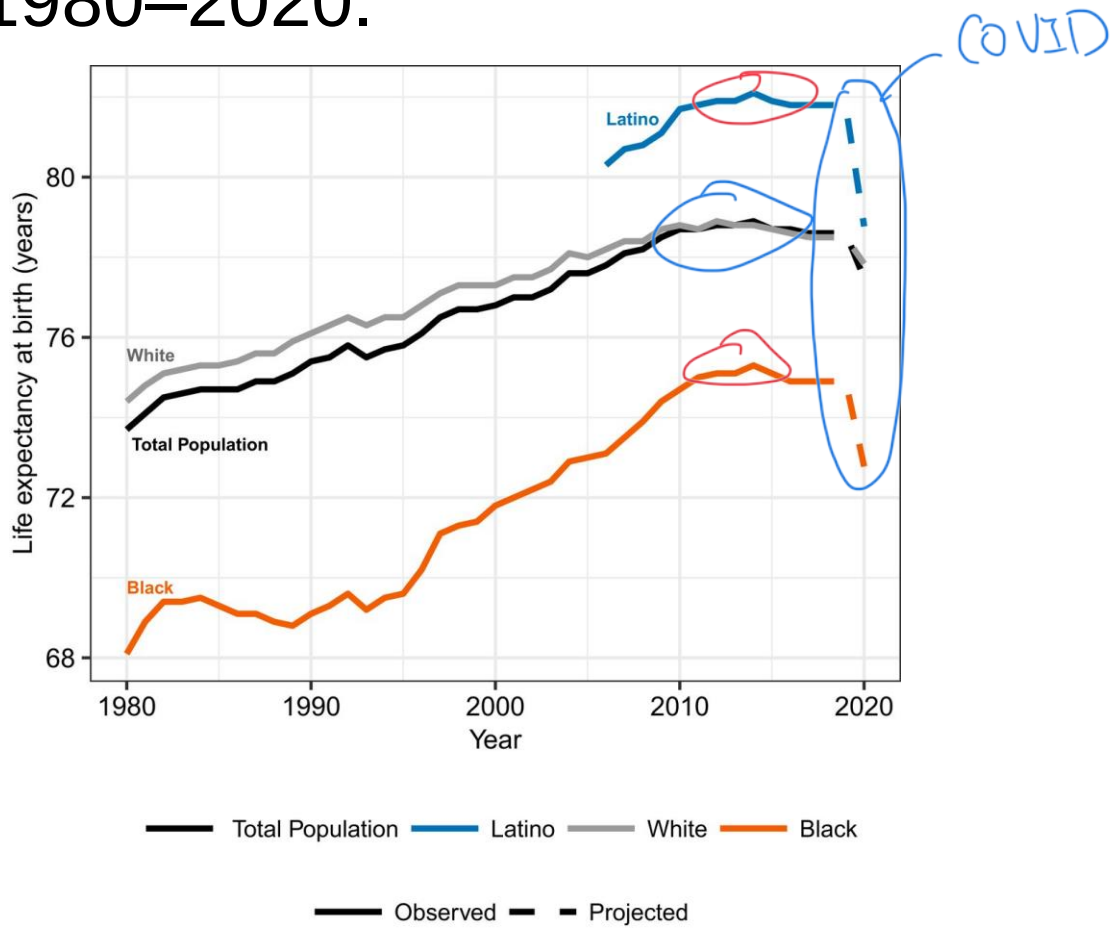
Life expectancy for Indigenous and non-indigenous in Australia

Table 6.2: Life expectancy (years) at birth, by sex and Indigenous status, 2005–2007, 2010–2012 and 2015–2017

Indigenous status	Males 2005–2007	Males 2010–2012	Males 2015–2017	Females 2005–2007	Females 2010–2012	Females 2015–2017
Indigenous	67.2	69.1	71.6	72.9	73.7	75.6
Non-Indigenous	78.7	79.7	80.2	82.6	83.1	83.4
Difference	11.5	10.6	8.6	9.7	9.5	7.8

Source: https://www.aihw.gov.au/reports/life-expectancy-death/deaths/contents/life-expectancy

Trends in US life expectancy at birth by race and ethnicity: 1980–2020.



Source. Theresa Andrasfay and Noreen Goldman. [Reductions in 2020 US life expectancy due to COVID-19 and the disproportionate impact on the Black and Latino populations] .PNAS. 2021

Introduction to Ethics

What is ethics?

Ethics can be defined as “what is good or right for human beings“ (Homan and Frederick, 1995)

- normative: `what ought to be', rather than `what is’
- proactive (doing good) vs reactive (do no harm)
- legal vs ethical

Embedding ethics in everyday life

Process:

1. Moral awareness: *identify* decisions / situations with moral content, that are ethically sensitive (newspaper test)

2. Moral judgement: framework for analysing the situation- how *should* I react to these situations, what should I do?

3. Ethical action: what is actually done

Ethics in insurance: Discrimination and heterogeneity

Discrimination in Insurance

What exactly are we doing in actuarial statistics?

Differentiating between people on the basis of their risk profile (likelihood to make frequent and/or large claims). Why?

- To reward risk diminishing behaviours?
  (e.g. install locks on your windows)
- To punish risk increasing behaviours?
  (e.g. smoking)
- To make insurance affordable?
  (e.g. by excluding high risk profiles - high flood areas)
- To manage capital (the risk bearer) efficiently?
  (actually know the amount of risk the company has taken)
- To increase market share?
- To avoid bad risks?

But is this fair? desirable?

Discrimination in Insurance

Legal framework

“The Anti-Discrimination Act 1977 (NSW), when originally enacted, prohibited discrimination on the grounds of race, sex or marital status in the areas of employment, the provision of goods and services and accommodation, and on the ground of race in education. ... The scope of the Act has been significantly widened over the years, and the original enforcement mechanisms have been replaced by the establishment of an Anti-Discrimination Board to administer the Act and receive and conciliate complaints, and the Equal Opportunity Tribunal to hold inquiries into each complaint or matter referred to it under the Act."

https://www.legislation.nsw.gov.au/\#/view/act/1977/48/full

Discrimination in Insurance

Legal framework

Some exceptions in the Anti-Discrimination Act 1977 for Insurance and Superannuation for the use of age, sex, marital status, disability provided that the terms and conditions:

- are based upon actuarial or statistical data on which it is reasonable to rely, and

- are reasonable having regard to the data and any other relevant factors:

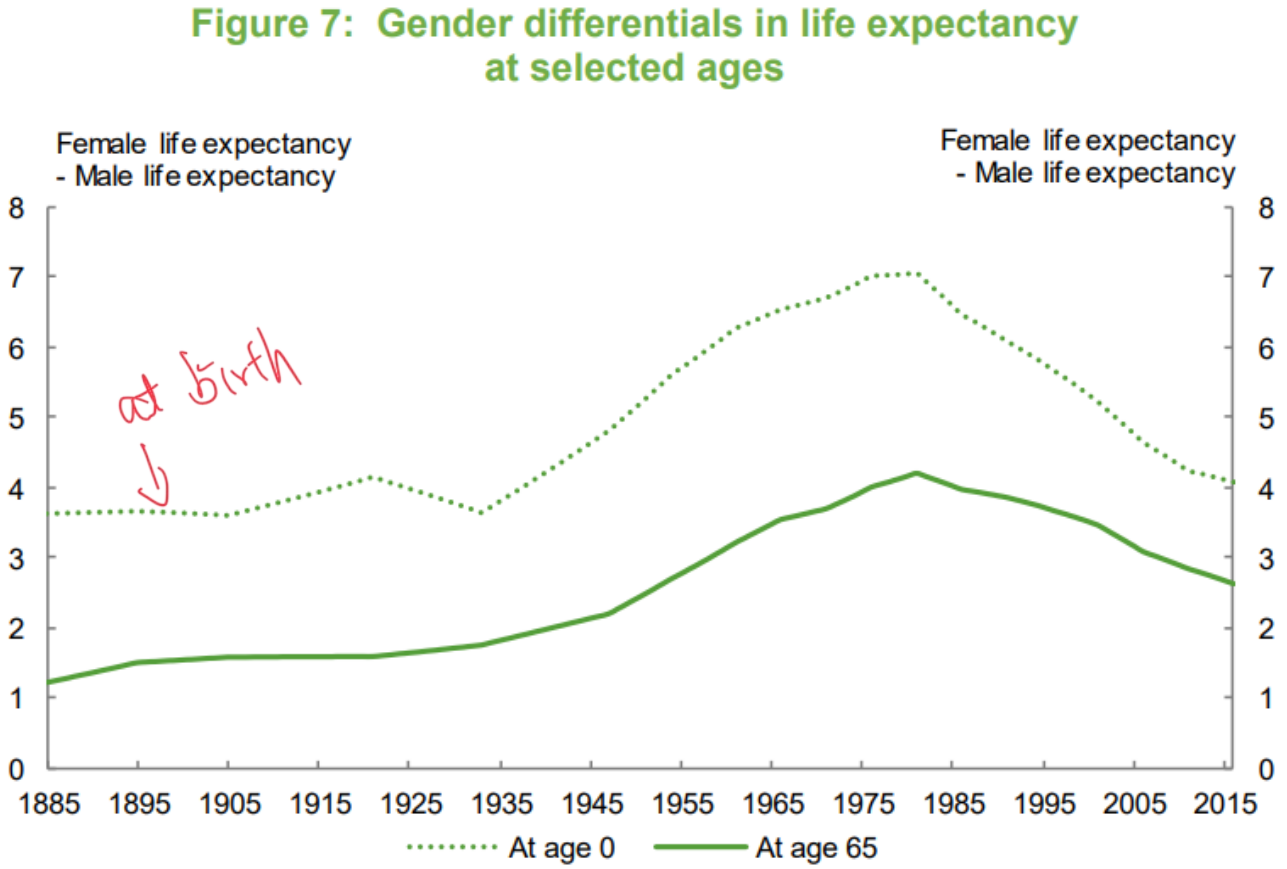
https://www.legislation.nsw.gov.au/\#/view/act/1977/48/part3/div4/sec37

Heterogeneity in Insurance

We know that mortality and morbidity vary according to socio-economic and behavioural factors such as:

- Occupation
- Education
- Income
- Gender
- Climate/geography
- Genetics
- Lifestyle habits (diet, smoking, exercise)

Gender gap in life expectancy: Australia



Source: **Australian Life Tables 2015-17 (https://aga.gov.au/publications/life-tables/australian-life-tables-2015-17)**

Socio-economic underwriting: questions

2. ELIGIBILITY FOR LOW RISK OR PROFESSIONAL INDIVIDUAL WORK RATING

1. Are the usual activities of your job 'white collar'? Occupation — Yes ☐ No ☐

   This means:

   - you spend more than 80% of your job doing clerical or administrative activities in an office-based environment, or
   - you're a professional using your university qualification in a job that has no unusual work hazards (some examples of unusual work hazards include: working underground, working underwater, working at heights or working in the air).

2. Are you earning $100,000 or more a year from your job? Income — Yes ☐ No ☐
3. Do you have a university qualification? Education — Yes ☐ No ☐
4. Do you have a management role in your company? Yes ☐ No ☐

Please note:

- Eligibility for a Low Risk or Professional individual work rating is subject to acceptance by TAL Life Limited ABN 70 050 109 450 AFSL 237848 (the Insurer).
- If accepted, we'll apply the higher of your category or individual work rating to your cover.
- If your application is not successful, there'll be no change to your individual work rating but we'll still apply the higher of your category or individual work rating.

Source: **Australian Super Insurance Forms (**https://www.australiansuper.com/-/media/australian-super/files/tools-and-advice/forms-and-fact-sheets/insurance/forms/change-your-work-rating.pdf)

Socio-economic underwriting: rates

The cost of Income Protection

How much you'll pay for Income Protection depends on your age, individual work rating, waiting period, benefit payment period and cover amount.

Use the formula on page 34 and the costs below to calculate the total cost of your Income Protection (age-based or fixed cover).

Weekly cost (in dollars) for $100 a month of Income Protection

Age	Standard work rating						Low Risk work rating						Professional work rating					
	Benefit payment period						Benefit payment period						Benefit payment period					
	Up to 2 years		Up to 5 years		Up to age 65		Up to 2 years		Up to 5 years		Up to age 65		Up to 2 years		Up to 5 years		Up to age 65	
	Waiting period (days)						Waiting period (days)						Waiting period (days)					
	30	60	30	60	30	60	30	60	30	60	30	60	30	60	30	60	30	60
15–20	0.078	0.016	0.179	0.124	0.435	0.318	0.039	0.008	0.090	0.062	0.244	0.178	0.036	0.008	0.081	0.056	0.218	0.159
21	0.078	0.018	0.182	0.126	0.447	0.326	0.039	0.009	0.091	0.063	0.250	0.183	0.036	0.009	0.082	0.057	0.224	0.163
22	0.079	0.021	0.185	0.128	0.459	0.334	0.040	0.011	0.093	0.064	0.257	0.187	0.036	0.010	0.083	0.058	0.230	0.167
23	0.081	0.023	0.189	0.130	0.471	0.343	0.041	0.012	0.095	0.065	0.264	0.192	0.037	0.011	0.085	0.059	0.236	0.172
24	0.083	0.027	0.192	0.132	0.483	0.351	0.042	0.014	0.096	0.066	0.270	0.197	0.038	0.013	0.086	0.059	0.242	0.176
25	0.087	0.029	0.197	0.136	0.498	0.363	0.044	0.015	0.099	0.068	0.279	0.203	0.040	0.014	0.089	0.061	0.249	0.182
26	0.090	0.032	0.199	0.137	0.508	0.369	0.045	0.016	0.100	0.069	0.284	0.207	0.041	0.015	0.090	0.062	0.254	0.185
27	0.094	0.035	0.202	0.139	0.519	0.375	0.047	0.018	0.101	0.070	0.291	0.210	0.043	0.016	0.091	0.063	0.260	0.188
28	0.099	0.039	0.206	0.141	0.533	0.382	0.050	0.020	0.103	0.071	0.298	0.214	0.045	0.018	0.093	0.063	0.267	0.191
29	0.103	0.042	0.210	0.144	0.548	0.390	0.052	0.021	0.105	0.072	0.307	0.218	0.047	0.019	0.095	0.065	0.274	0.195
30	0.109	0.047	0.216	0.147	0.565	0.400	0.055	0.024	0.108	0.074	0.316	0.224	0.050	0.022	0.097	0.066	0.283	0.200
31	0.114	0.052	0.224	0.151	0.587	0.413	0.057	0.026	0.112	0.076	0.329	0.231	0.052	0.024	0.101	0.068	0.294	0.207
32	0.119	0.057	0.232	0.156	0.612	0.427	0.060	0.029	0.116	0.078	0.343	0.239	0.054	0.026	0.104	0.070	0.306	0.214
33	0.127	0.063	0.242	0.162	0.640	0.445	0.064	0.032	0.121	0.081	0.358	0.249	0.058	0.029	0.109	0.073	0.320	0.223
34	0.134	0.068	0.254	0.170	0.673	0.467	0.067	0.034	0.127	0.085	0.377	0.262	0.061	0.031	0.114	0.077	0.337	0.234
35	0.141	0.074	0.267	0.178	0.709	0.491	0.071	0.037	0.134	0.089	0.397	0.275	0.064	0.034	0.120	0.080	0.355	0.246
36	0.150	0.079	0.281	0.188	0.746	0.517	0.075	0.040	0.141	0.094	0.418	0.290	0.068	0.036	0.126	0.085	0.373	0.259
37	0.159	0.085	0.297	0.200	0.786	0.547	0.080	0.043	0.149	0.100	0.440	0.306	0.072	0.039	0.134	0.090	0.393	0.274
38	0.168	0.091	0.315	0.213	0.829	0.579	0.084	0.046	0.158	0.107	0.464	0.324	0.076	0.041	0.142	0.096	0.415	0.290
39	0.179	0.098	0.335	0.228	0.873	0.614	0.090	0.049	0.168	0.114	0.489	0.344	0.081	0.045	0.151	0.103	0.437	0.307
40	0.190	0.105	0.356	0.246	0.920	0.652	0.095	0.053	0.178	0.123	0.515	0.365	0.086	0.048	0.160	0.111	0.460	0.326

Source: **Australian Super Insurance Guide (**https://www.australiansuper.com/-/media/australian-super/files/tools-and-advice/forms-and-fact-sheets/insurance/guides/insuranceguide-industry.pdf)

Health underwriting: questions

	Height (cm)	(ft/in)	Weight (kg)	(st/lb)
5. What is your height and current weight?		OR		OR

6. Excluding the contraceptive pill and inhaled asthma medication, have you been advised to take or been given prescribed medication by a medical practitioner that is intended to be used for three months or longer within the last year (including but not limited to blood pressure, diabetes, oral steroids for asthma or depression medication)? Yes ☐ No ☐

7. Have you been unable to work because of illness or injury for more than two consecutive weeks in the last three years? Yes ☐ No ☐

8. Have you undergone any medical treatment, investigation or an operation, suffered from or are you contemplating surgery for any illness or injury that would affect your long-term health and require ongoing medical supervision? This includes, but is **not limited to**:
   - cancer or diabetes
   - high blood pressure, cholesterol or any heart complaint
   - alcohol or drug abuse, and
   - stroke, paralysis, neurological disorder or multiple sclerosis? Yes ☐ No ☐

9. Have you been infected with, or have you ever tested positive for AIDS (Acquired Immune Deficiency Syndrome), HIV (Human Immunodeficiency Virus) or Hepatitis B and C? Yes ☐ No ☐

5. PERSONAL HEALTH STATEMENT (CONTINUED)

10. Have you received any medical advice or undergone any medical treatment, investigation or an operation, suffered from or are you contemplating surgery for any of the following:
    - Any injury or complaint of the back, neck, knee or shoulder requiring time off work in the last 12 months and/or any disease, disorder or degeneration to the muscles, tendons, bones, discs or joints? Yes ☐ No ☐
    - Depression or mental disorder (including but not limited to stress, anxiety, chronic tiredness or fatigue, panic attacks, post traumatic stress, behavioural or nervous disorder)? Yes ☐ No ☐
    - Chest pain, asthma, bronchitis or any other lung complaint requiring hospitalisation within the last five years? Yes ☐ No ☐
    - Disorders of the kidney, bladder, prostate, ovaries, gall bladder, bowel, or liver? Yes ☐ No ☐
    - Epilepsy? Yes ☐ No ☐

Source: **Australian Super Insurance Guide**(https://www.australiansuper.com/-/media/australian-super/files/tools-and-advice/forms-and-fact-sheets/insurance/guides/insuranceguide-finsuper.pdf)

Gender in Europe

“Today is an important moment for gender equality in the European Union. 30 years ago, the Supreme Court of the United States ruled that the Civil Rights Act of 1964 prohibits different treatment of insured persons on the basis of their sex in connection with pension funds. Today, the EU's Court of Justice ruled that different insurance premiums for women and men constitute sex discrimination and are not compatible with the EU's Charter of Fundamental Rights. Member States are not allowed to derogate from this important principle in their national legislation. The relevant “opt out" clause in the Council's 2004 Directive on gender equality is thus illegal. […]"

EU press release, MEMO/11/123 Event Date: 01/03/2011
(https://ec.europa.eu/commission/presscorner/detail/en/MEMO_11_123)

This has consequences for insurance (see this article https://www.economist.com/buttonwoods-notebook/2011/03/01/bonkers)

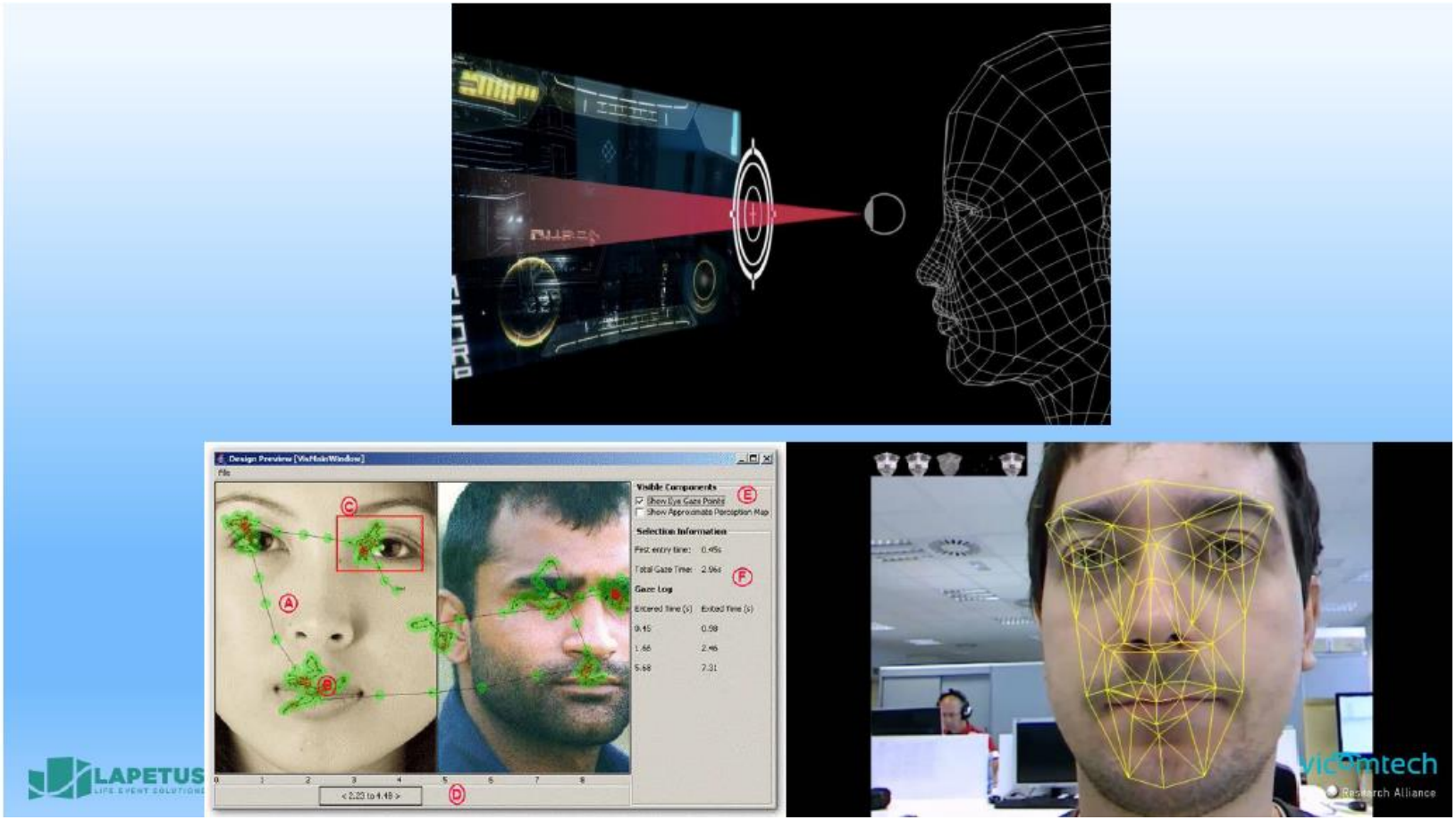
Ethics in insurance: Data science and new forms of data

Data science: opportunities and challenges for insurance

- World producing enormous amount of data (search engines, social media, wearables, etc.)
- Many aspect of life have been transformed by Data Science and “Big-Data" (e.g. Health care, politics and sports)
- Many applications in insurance
  - Wearable fitness devices in health insurance (see this article)
  - Telematics devices in motor insurance (see this video)
- Advantages in terms of better:
  - Consumer targeting and product design
  - More accurate risk assessment, underwriting and pricing

Based on "Data Science in Insurance: Opportunities and Risks for Consumers" by Institute and Faculty of Actuaries

Risk profiling using selfies



Source: Olshansky (2017), [The future of life event prediction is here](#) and [Lapetus](#)

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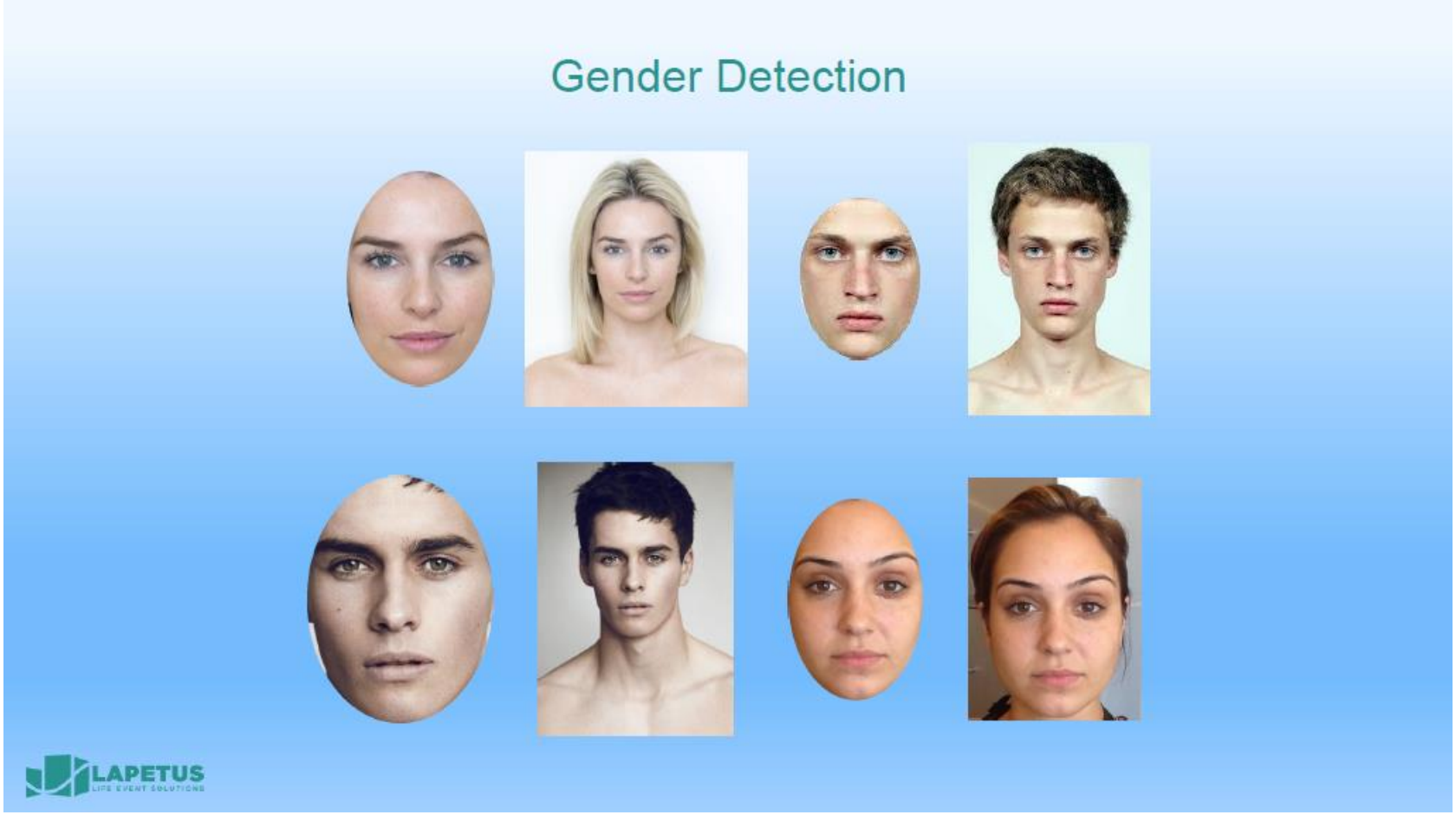

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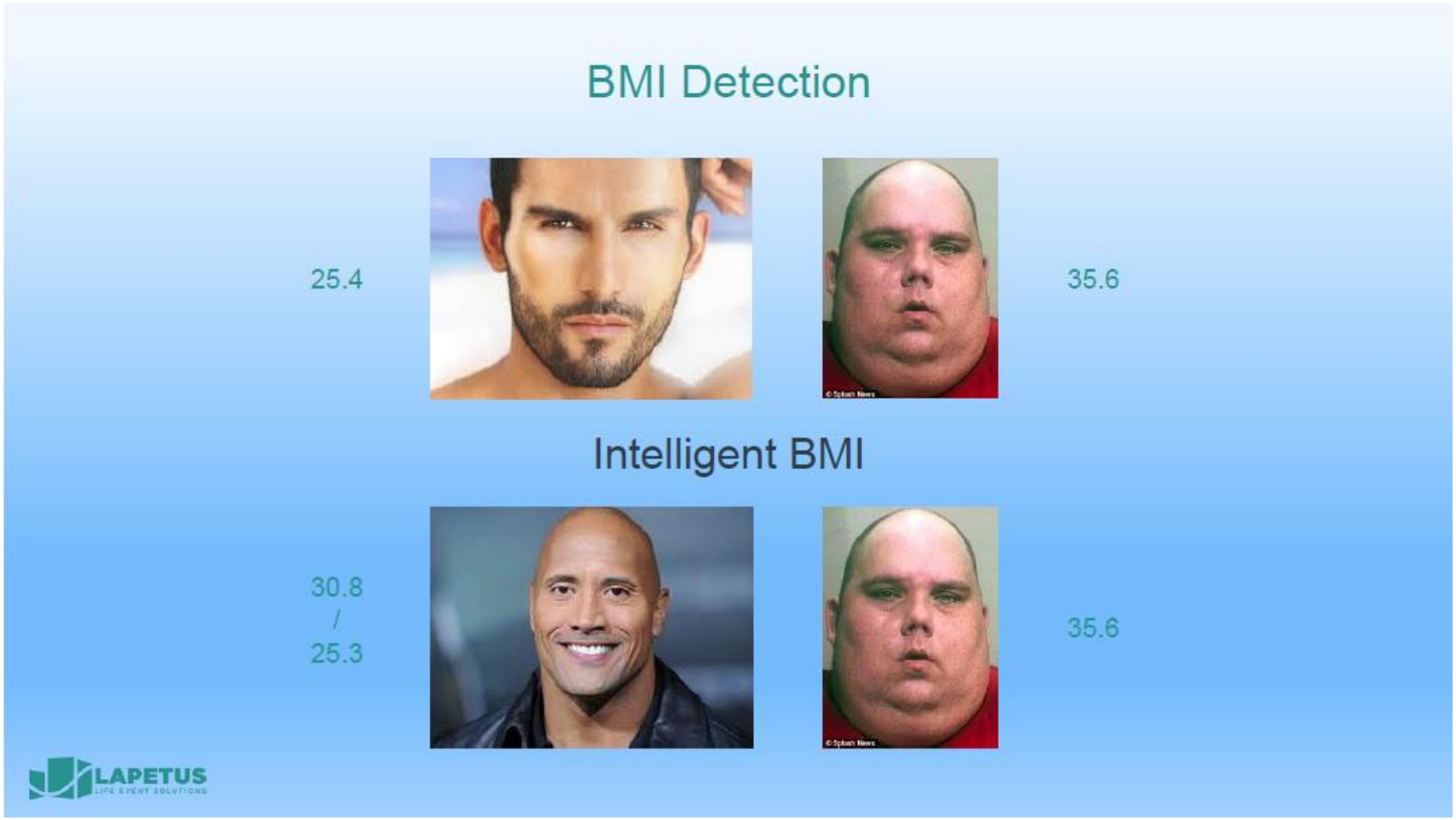

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Risk profiling using selfies

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Wearables and insurance

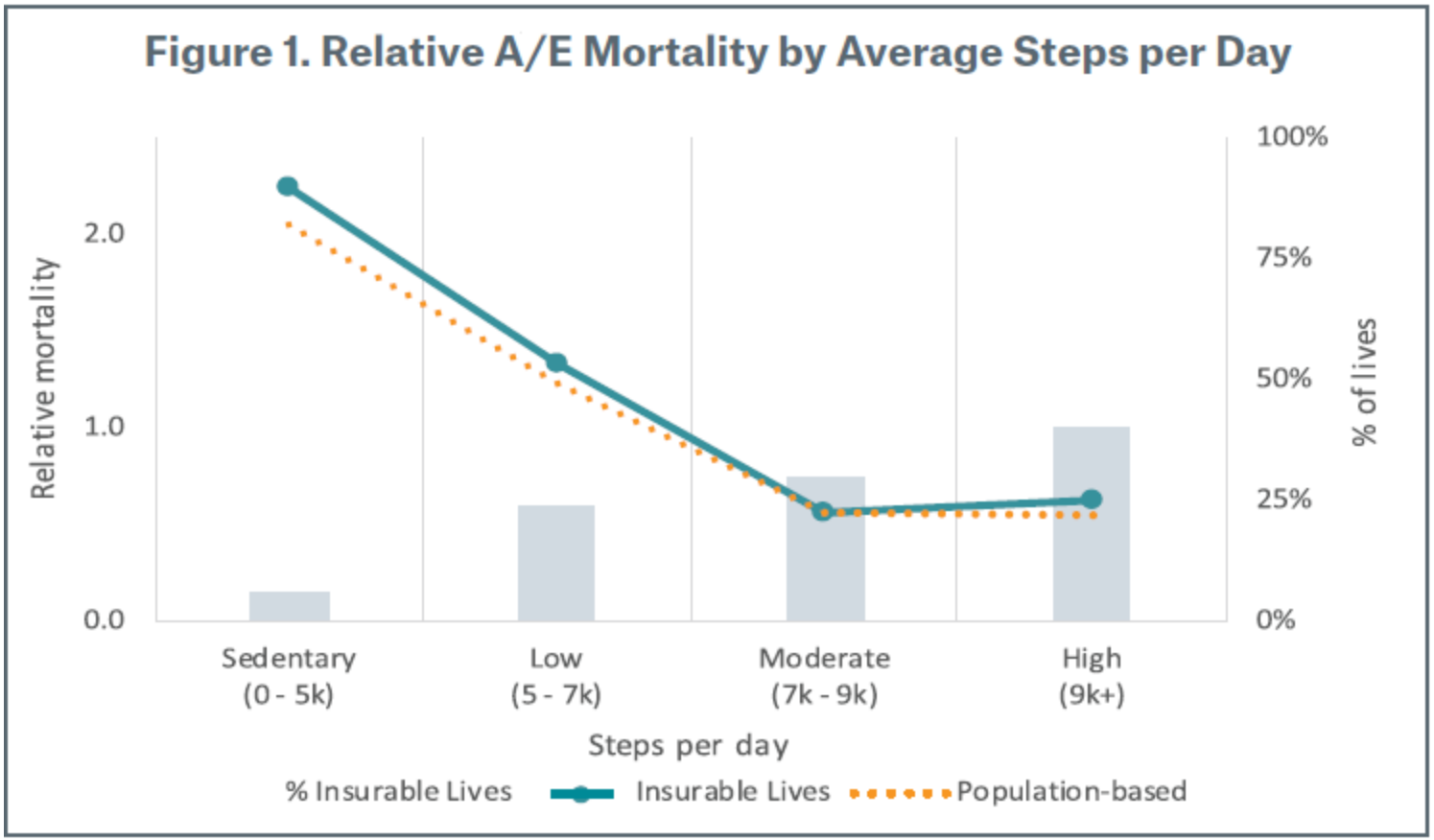
Wearable and the internet of things are increasingly being used by life and health insurers:

- Engaging with customers
- Rewarding healthier behaviours
- Continuous underwriting
- Health condition and case management

From: Wearables and Internet of Things Working Party (2018)

Wearables and the Internet of Things: Considerations for the life and health insurance industry

Wearables and insurance: Steps and mortality



From: Munich Re (2018), [Stratifying mortality risk using physical activity as measured by wearable sensors]

Data science: Public interest concerns

- Insurance unavailable for some?
- Less pooling of risk
- Price discrimination
- Data protection and privacy
- Transparency and judgment

Based on "Data Science in Insurance: Opportunities and Risks for Consumers" by Institute and Faculty of Actuaries

Ethics in insurance: Central questions for actuaries

Some relevant questions for actuaries

Discrimination

- How much discrimination is too much discrimination?
- Should we introduce distortions in a free market?
- Could too much regulation lead to the absence of insurance available? (affordability being part of availability)
- Should people be punished/rewarded for certain characteristics? (e.g.: being female, being a smoker, being rich, having a white-collar job)
- Should we ensure everyone (including high risks) have access to insurance?

conduct risk ▷ risk that people may end up with the wrong product for their needs

Some relevant questions for actuaries

Data science

- When should interventions be made to keep broader pools of risk and hence maintain or increase levels of cross-subsidy between different policyholders?
- What are the rights but also obligations of policyholders with respect to data being gathered on them?
- How should insurers ensure transparency to maintain policyholders' trust in the use of their data?
- Are applications of Data Science in insurance putting consumers' needs first, or are there wider conduct risk concerns?

Based on "Data Science in Insurance: Opportunities and Risks for Consumers" by Institute and Faculty of Actuaries

Ethical theories

Utilitarianism

“The doctrine that actions are right if they are useful or for the benefit of a majority." (New Oxford American Dictionary)

- In other words: “What is best is what leads to the best outcome for most.“
- The end goal can justify the means
- Problem: hard to define the optimisation problem
  - How do you dene “best"? (back to square 1)
  - How do you define “most"? (the majority could be the self - `Ethical egoism’)
  - E.g.: is profit an end or a goal?
- Doesn't always work: 20 people on a boat: one needs to be killed for the others to survive. What do you do?

Deontology

“The study of the nature of duty and obligation." (New Oxford American Dictionary)

- In other words: “Something is right or wrong, irrespective of the consequences“
- Examples:
  - Human rights (is meant to be universal)
  - Don't do to others what you wouldn't like them to do to you (a fairly universal principle, across cultures and religions)
  - `Takaful' insurance: insurance organised according to Islamic law
- positive rights (e.g., having food and shelter) vs negative rights (e.g., not to be killed or raped)
- not always easy to determine in an insurance context. . .

A framework for ethical reasoning

Ethical Reasoning

Dobrin (2009) provides a framework to develop a well reasoned course of action when faced with an ethical dilemma.

- Step 1 - Identify stakeholders, gather and interpret the key facts
- Step 2 - Identify relevant core values
- Step 3 - Courses of Action and Consequences
- Step 4 - How would this decision be perceived?
- Step 5 - Can you explain your choice to others?

Based on Dobrin (2008), "Business Ethics – The Right Way to Riches"

Step 1-Identify stakeholders, gather and interpret the key facts

- Identify **stakeholders** and be as neutral as possible in collecting key data relating to this situation.
- What **assumptions** are being made? (assumptions are ideas about the world that are taken to be true) Are they reasonable?
- What are the **interests** of the main stakeholders involved?
- **Interpret the facts**. What do the facts mean to you?

Based on Dobrin (2008), "Business Ethics – The Right Way to Riches"

Step 2-Identify relevant core values

- What **core values** do you think are relevant to the decision? E.g. *Privacy, Honesty, Respect, Responsibility or Fairness*. Gentile (2010) & Kidder (2005).

- Are there any other **factors or considerations** that you may have overlooked?

Based on Dobrin (2008), "Business Ethics – The Right Way to Riches"

Step 3-Courses of Action and Consequences

- What are the **possible courses of action** in this situation?
- Identify the **consequences** of these different courses of action on the stakeholders involved? In doing so, determine the positive or negative social, cultural, economic and environmental impacts.
- Could there be any unintended consequences?
- Select the action that you think will create the most good or avoid most harm.

Based on Dobrin (2008), "Business Ethics – The Right Way to Riches"

Step 4- How would this decision be perceived?

- Explore your feelings about the situation. E.g. pride, shame, guilt, etc.
- How will this decision be perceived by the stakeholders

Based on Dobrin (2008), "Business Ethics – The Right Way to Riches"

Step 5- Can you explain your choice to others?

- Can you rationally justify your decision?
- Can you open your decision to the scrutiny of others?

Based on Dobrin (2008), "Business Ethics – The Right Way to Riches"